3.3.11 Wildland and Rangeland Fires

Wildland and rangeland fires are hazards that impact Montana every year. In mild fire seasons, there may be relatively small timber and crop resource losses. In extreme years, there can be resource devastation, habitat destruction, structure losses and deaths. Historically, fire has been an integral part of forest and grassland regeneration. Fire plays an important role in the growth and generation of healthy forest and grassland habitats.

A **wildland or rangeland fire** is an uncontrolled fire, a term which includes grass fires, forest fires, and scrub fires, be they man caused or natural in origin. The **wildland/urban interface (WUI)** is defined as the zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuel.

3.3.11.1 Background

- Since 1933, 39 wildland fire fatalities have occurred in Montana. Twenty of these deaths were from burnovers (such as the Mann Gulch Tragedy), seven were in aircraft crashes, five from falling snags, three from training accidents, two in motor vehicle accidents, one from hypothermia, and one from a heart attack.
- Forest fuels are of primary concern in Western Montana where crown fire potential is high in many areas, including some areas along the wildland/urban interface. In the valleys and agricultural areas of western Montana, sagebrush and dry grass may also provide sufficient fuels for wildfires.
- Dry grass, associated with rangeland and farmland Conservation Reserve Program (CRP), is a primary fuel for eastern Montana wildfires. The rate of fire spread varies directly with wind speed. The windy conditions typical to the region can cause wildfires to spread rapidly. In addition, eastern Montana has areas of ponderosa pine, sagebrush, and other fuels subject to wildfires.
- As residential areas expand into relatively untouched wildlands, people living in the WUI are increasingly threatened by forest fires. Protecting structures in the wildland from fire poses special problems and can exhaust firefighting resources.
- Montana Department of Natural Resources and Conservation (DNRC) data for fire starts from 1997 through 2006 show 39 percent of wildfires were started by lightning and 61 percent were human caused. Sources of human caused fires include debris burns (28 percent); campfires (22 percent); equipment caused fires (7 percent); and railroad starts (6 percent).
- Montana DNRC fire report data shows that 50 percent more fires occurred in WUI than non-WUI areas during the 1996-2006 period. Within the WUI areas, 64 percent of the fires were human caused. Fires in the WUI cost an average 46 percent more to suppress than non-WUI fires.
- If heavy rains follow a major fire in steep terrain, other natural disasters can occur, including landslides, mudflows, and floods. Once ground cover has been burned away, little is left to hold soil in place on steep slopes and hillsides.
- Wildland fire is part of the natural ecological process of many ecosystems. The effects of fire can retard or accelerate the natural development of plant communities, alter species diversity, change nutrient flows, and interact with other physical, chemical, and biological systems. Without wildland fires, the ecological health of many forests, rangelands, and wilderness areas decline.
- Wildland fires occur naturally and are one of the many natural sources of airborne particulate matter (tiny particles such as dust, soot, etc.) Particulate matter is the main pollutant of concern from smoke because it can lead to serious health problems. Smoke can also adversely affect the clarity (visual range) of our air.

Sources: NIFC, 2007; FEMA, 2004; Montana DNRC, 2007c.

3.3.11.2 History of Wildland and Rangeland Fires in Montana

Wildland and rangeland fires occur every year; they are part of the normal vegetative cycle for forest and grasslands in the state. The frequency at which they occur depends on the forest and vegetation type and the prevailing weather conditions. Historically, vegetation types influenced the fire recurrence intervals, but fire regimes have been altered through fire suppression and changes in the landscape. Fire suppression has increased the amount of fuels available to burn and decreased the separation of fuels, resulting in greater undergrowth and denser vegetation. These changes have increased fire severity and frequency, compared to the fire regime prior to the twentieth century. An added factor in fire recurrence is the weather and drought, including extended periods of low precipitation, insect infestation, and heat that increase the potential severity of a fire season. When these conditions mix with high winds, low humidities, high temperatures, and/or dry lightning storms, the fires can be devastating.

By all historical records, the Great Idaho fire of 1910 in northern Idaho and western Montana was the largest forest fire in American history. The fire burned 3 million acres, killed 86 people, destroyed numerous towns in northern Idaho and western Montana, and by some accounts, most of the destruction occurred in 6 hours. The hurricane winds of August 20 and 21, 1910 turned numerous fires scattered throughout the region into a blow-torch. The fire occurred when the US Forest Service was a fledgling agency that lacked the personnel, equipment, and communications to effectively address wildfire. Even with today's technology and resources devoted to wildland fire fighting, that magnitude of fire could occur again, given similar conditions.

Since 1988, Montana has experienced an increase in the size and intensity of fires. The Greater Yellowstone Fire of 1988 covered 2.3 million acres, employed an estimated 25,000 firefighters, and cost nearly $120 million for fire suppression. One firefighter and one pilot died and structure losses were estimated at $3 million (YPN, 2004). Fires in western Montana in 2000, 2003 and 2006 were again devastating, burning 1.2 million acres in 2000, 730,000 acres in 2003, and 1.04 million acres in 2006 (Montana DNRC, 2007a).

Grassland fires in eastern Montana have been equally as devastating. In July 1999, the Fishel Creek Fire threatened the town of Musselshell. The fire burned 33,000 acres, one home and threatened the evacuation of Musselshell. Later that same year, a grassfire burned 18,000 acres and a portion of the town of Outlook, causing $4 million in damages. In all, about 105,000 acres burned in five hours in eastern Montana that night. In July 2003, the Missouri Breaks Complex in eastern Garfield County burned 130,927 acres and destroyed eight structures and 610 miles of fence.

Table 3.3.11-1 lists some of some of the most serious forest fires in Montana history. Some were significant because of their size, others because of the value of the resources lost or the number of lives lost. Many other fires, too many to mention, have affected the lives and property of Montanans. **Table 3.3.11-2** shows the total number of fires and acreage burned by year in Montana.

Table 3.3.11-1 Historically Significant Wildland Fires in Montana

Date	Name	Location	Acres	Significance	Suppression Costs
1910	Great Idaho	Idaho and Montana	3,000,000	85 lives lost	
1949	Mann Gulch	Montana	4,339	13 smokejumpers killed	
1988	Greater Yellowstone National Park	Montana, Idaho and Wyoming	2,281,800	Large amount of acreage burned; 52 buildings destroyed or damaged.	$120 Million
1988	Canyon Creek	Montana	250,000	Large amount of acreage burned	
2000	Bitterroot Complex and others	Montana, Idaho, Alaska, Oregon, Washington, Wyoming	Nationwide 8,000,000; Montana 1,160,145	Large amount of acreage burned	$2.1 Billion nationwide
2003	Various Montana fires	Montana	378,000	5 residences and 3 buildings burned, 2,800 buildings threatened	$168.6 Million in Montana
2006	Derby/Jungle Fires	South of Livingston and Big Timber	237,000	26 homes, 20 outbuildings	$20 million in Montana

Source: NIFC, 2004; USDA Forest Service, 2003; NOAA-NCDC, 2007; FEMA, 2004

Table 3.3.11-2 Fire and Burned Acreages in Montana by Year

Year	Fires	Acres	Year	Fires	Acres
1991	1,496	122,530	1999	1,932	87,569
1992	1,500	32,787	2000	2,802	1,160,145
1993	670	6,055	2001	1,463	146,819
1994	2,743	281,430	2002	1,372	119,309
1995	1,113	22,171	2003	2,326	736,809
1996	1,836	246,498	2004	1,447	18,445
1997	882	9,731	2005	1,316	103,294
1998	1,781	117,090	2006	2,302	1,047,118

Source: Montana DNRC, 2007a

3.3.11.3 Declared Disasters and Emergencies from Wildland and Rangeland Fires

Requests for public assistance for wildland and rangeland fires can be from the State and/or Federal level. The Governor of Montana may declare an Executive Order (EO) that will permit the use of State funds or activation of Montana National Guard. FEMA may authorize Fire Management Assistance Grants (FMAG), formerly Fire Suppression Assistance (FSA), to local and State agencies for fire suppression. These funds are exclusive of other firefighting costs on Federal land by Federal agencies. In extreme fire years, the Governor may request a Presidentially Declared Disaster for a wildland fire. This has occurred twice: in 1988 for most of the state; and in 2000 for three counties. **Table 3.3.11-3** shows wildfire disasters or emergencies declared in Montana.

Table 3.3.11-3 Montana Disaster Declarations from Wildfire

Date	Event	Federal	State	Local
August 1, 1979	Forest Fires. National Guard Activation		$8,411	
August 1988	Wildland Fires. All counties in the State.			
August 1, 1990	Wildland Fires (EO 10-90). Broadwater County. National Guard Activation.		$7,190	$24,205
	Department of State Lands		$83,252	
November 1, 1990	Wildland Fires (EO 15-90). National Guard Activation. Beartooth Complex, Lewis & Clark County.			
November 1, 1990	Wildland fire (EO 17-90). Turkey Fire, No claim submitted.			
May 1, 1991	Wildland Fires (EO 05-91) 16 Counties and Department of State Lands			
June 1, 1991	Wildland Fires (EO 10-91) 16 Counties and Department of State Lands			
October 1, 1991	Wildland Fires (EO 31-91). All counties in the State.			
October 1, 1991	Wildland Fires (EO 33-91). Blaine County		$49,882	
March 1, 1992	Wildland Fires (EO 06-92). Teton and Cascade Counties			
August 1, 1992	Wildland Fires (EO 15-92). 12 Counties			
July 27, 1994	Wildland Fires (EO 12-94). Lincoln, Flathead, Sanders and Lake Counties. Activation of Montana National Guard.			
July 27, 1994	Wildland Fires (EO 13-94). 9 Counties. Activation of Montana National Guard.			
August 10, 1994	Wildland Fires (EO 14-94). 16 Counties. Activation of Montana National Guard.			
August 16, 1994	Wildland Fires (EO 15-94). 13 Counties. Activation of Montana National Guard.			
	FEMA-MT-2111-FSA; Little Wolf Fire, Flathead County	$2,887,129		
	FEMA-MT-2110-FSA; Wilderness Complex Fire, Lincoln County	$16,959		
September 9, 1994	Wildland Fires (EO 19-94). 42 Counties. Activation of Montana National Guard.			
August 10, 1996	Wildland Fires (EO 20-96). 12 Counties. Activation of Montana National Guard.		$11,332	
August 16, 1996	Wildland Fires (EO 21-96). All counties in the State. Activation of Montana National Guard.		$151,644	
September 5, 1996	Wildland Fires (EO 23-96). 16 Counties. Activation of Montana National Guard.		$3,710	
September 2, 1998	Wildland Fires (EO 15-98)		$46,963	
July 26, 1999	Wildland Fires (EO 10-99). 32 Counties and activation of Montana National Guard. **FEMA-2266-FSA-MT:** Fishel Creek Complex Fire, Musselshell County	$580,729	$388,150	
November 5, 1999	Wildland Fire (EO 17-99) Disaster Declaration for the Town of Outlook. Railroad paid for all costs incurred.			$126
July 24, 2000	Wildland Fires (EO 17-00). 12 Counties and activation of Montana National Guard.			
	FEMA-2314-FSA-MT: Broadwater, Lewis & Clark, Jefferson, Meagher, Gallatin Counties	$23,568,300		$128,812
July 27, 2000	Wildland Fires (EO 18-00). All counties in the State and activation of Montana National Guard.			
	FEMA-2317-FSA-MT. Deer Lodge, Granite, Mineral, Missoula, Powell, Ravalli, and Silver Bow Counties.	$13,339,160		$38,516

Table 3.3.11-3 Montana Disaster Declarations from Wildfire

Date	Event	Federal	State	Local
	FEMA-2318-FSA-MT. Beaverhead and Madison Counties.	$143,900		$4,807
	FEMA-2320-FSA-MT. Flathead, Lake, Lincoln and Sanders Counties.	$5,361,546	$5,640	$40,378
August 16, 2000	Wildland Fires (EO 20-00). All counties in the State and activation of MT Nat'l Guard.			
	FEMA-1340-DR-MT: 48 counties and 6 Indian nations.	$11,579,000		
	FEMA-2321-FSA:	$91,940		
	FEMA-2326-FSA:	$70,842	$21,483	$36,150
August 16, 2001	Wildland Fires (EO 20-01). 19 Counties and activation of the Montana National Guard.			
September 3, 2001	Wildland Fires (EO 22-01). 22 Counties and activation of the Montana National Guard.			
July 18, 2003	Wildland Fires (EO 14-03). All counties in the State and activation of MT Nat'l Guard.			
	FEMA-2483-FM-MT. Missouri Breaks Complex, Garfield County.	$256,726	$76,690	$8,885
	FEMA-2484-FM-MT. Robert Fire, Flathead County.	$420,963	$115,082	$25,240
	FEMA-2485-FM-MT. Wedge Canyon Fire, Flathead County.	$351,321	$6,730	$110,377
August 7, 2003	Wildland Fires (EO 16-03). All counties in the State and activation of MT Nat'l Guard.			
	FEMA-2488-FM-MT, Hobble Fire, Sweet Grass and Stillwater Counties.	$1,094,812	$334,807	$30,130
	FEMA-2489-FM-MT, Cherry Creek Fire, Sanders County.	$3,865	$769	$519
	FEMA-2490-FM-MT, Mineral & Missoula Fire Zone & Cooney Ridge Fire Complex, Mineral, Missoula and Ravalli Counties	$9,044,295	$2,944,971	$69,794
	FEMA-2492-FM-MT, Lincoln Complex, Lewis & Clark and Powell Counties	$740,657	$243,476	$3,410
	FEMA-2494-FM-MT, Flathead Fire Zone, Flathead County	$637,540	$130,470	$82,043
August 4, 2005	Wildland Fires (EO 16-2005). Fire bucket training w/ MT Nat'l Guard.		$32,503.41	
July 11, 2006	Wildfires (EO 34-06). Activation of MT Nat'l Guard due to threat of wildfire.			
August 1 2006	Wildfires (EO 36-06). Activation of MT Nat'l Guard due to threat of wildfire.			
August 21, 2006	Wildfire (EO 39-06). Statewide disaster.			
	FEMA-2652FM-MT-Sanders Fire- Stillwater County			
	FEMA-2669-FM-MT-Emerald Hills Fire-Yellowstone County			
	FEMA-2671-FM-MT Derby Fire-Stillwater & Sweetgrass Counties			
Total Costs		**$56,850,524**	**$4,657,515**	**$469,773**

Sources: MDES, 2007

Wildfires have a profound effect on the forest product industry and recreational businesses. The U.S. Small Business Administration (SBA) can make declarations to provide assistance to businesses that are directly affected by forest fires. The SBA issued the following disaster declaration in 2003:

- **2003 SBA Declaration #9W74 – Forest Fire:** Small Businesses in Beaverhead, Broadwater, Carbon, Cascade, Chouteau, Deer Lodge, Flathead, Gallatin, Glacier, Golden Valley, Granite, Jefferson, Lake, Lewis & Clark, Lincoln, Madison, Meagher, Mineral, Missoula, Park, Pondera, Powell, Ravalli, Sanders, Silver Bow, Stillwater, Sweetgrass, Teton, Toole, Wheatland, and Yellowstone Counties are eligible to apply for a low-interest Economic Injury Disaster Loan from the SBA. These loans are available to small businesses that have suffered financial losses as a result of Forest Fires in 2003. These loans cannot address physical damages caused by the disaster (US SBA, 2004).

Photo 3.3.11-1
Granite Creek, Montana, August 21, 2003 -- Safety Officer Tom Nash from Virginia directs a firefighter crew bus through an area where fires had advanced. Crews were directed to pull back from the Hopeful 2 fire because high winds caused the fire to run. Photo by Andrea Booher/FEMA

Photo 3.3.11-2
A Ball of Flames Rolls Skyward as Part of the Fridley Fire engulfs a stand of trees Monday, August 20, 2001 between Fridley and Eightmile Creeks southwest of Livingston. Erik Petersen Associated Press.
Source: Montanafires.com, 2004

3.3.11.4 Vulnerability to Wildland and Rangeland Fires

All of Montana is vulnerable in one form or another to wildland and rangeland fires. The probability and severity of fires are highly dependent upon weather conditions and fuel conditions and thus will change from year to year. Fire is predicated on drought conditions, and Montana's forests and rangeland are more capable of supporting fires following and during drought years than in "normal" years. Extreme dry periods in Montana have coincided with big fire years. The most severe and extensive fires on record from the first half of the 20th century occurred during periodic droughts, including those of 1889, 1910, 1919, 1926, 1934, and 1967 (Cilimburg and Short, 2003). Longer fire seasons caused by changing climate, lower precipitation, and reduced snow pack have also contributed to the increased level of fire activity in Montana (Montana DNRC, 2007c).

Exclusive of weather, other factors can contribute to the probability and intensity of fires, thus making the fires burn hotter, become harder to suppress, and result in structure loss and loss of life. More than 100 years of excluding fire from forested areas, combined with past land-use practices, have altered the landscape. The resulting changes include a heavy buildup of dead vegetation, dense stands of trees, a shift to species that have not evolved and adapted to fire, and, occasionally, even an increase in non-native fire-prone plants. Increased fuel loads are also attributable to infestations of spruce budworm and pine bark beetle in Montana's forests that have increased tree mortality. Because of these conditions, today's fires tend to be larger, burn hotter, and spread farther and faster, making them more severe, more dangerous, and more costly in human, economic, and ecologic terms (NIFC, 2007).

In central and eastern Montana, rangelands are also vulnerable to wildfires. Most fires burn in grass and sagebrush fuel types and although larger, generally are suppressed more quickly. The USDA Farm Service Agency's (FSA) Conservation Reserve Program (CRP) is a voluntary program available to agricultural producers to help them safeguard environmentally sensitive land. Producers enrolled in CRP establish long-term, resource-conserving covers to improve the quality of water, control soil erosion, and enhance wildlife habitat. In return, FSA provides participants with rental payments and cost-share assistance. Generally, CRP acreage may not be hayed or grazed during the Primary Nesting Season for certain wildlife unless under emergency or managed conditions. Although the CRP may benefit the environment in many respects, the program may also increase the fire risk in nearby communities (USDA, Farm Service Agency, 2007).

3.3.11.4.1 Fire Regimes/Condition Class

To assess the state's vulnerability to fire we need to understand how fire has historically shaped and maintained the forest and grassland ecosystems. Fire is a natural process in Montana's forests and grasslands, but different vegetative communities have different fire patterns or fire regimes. Some vegetative communities burn frequently in low severity fires while others burn less frequently but with great severity and mortality to the dominant overstory vegetation. Schmidt and others (2002) categorized historic fire regimes into the following five general categories:

Type I	0–35-year frequency	low severity
Type II	0–35-year frequency	stand-replacement severity
Type III	35–100+ year frequency	mixed severity
Type IV	35–100+ year frequency	stand-replacement severity
Type V	200+ year frequency	stand-replacement severity

Frequency describes the average number of years between fires. Severity is the effect of the fire on the dominant overstory vegetation. Low severity is when more than 70% of the understory and 90 percent of the overstory vegetation survives. Mixed severity is when there is mixed severity of the overstory and typically resulting in mosaic burn patterns. Stand-replacement severity results in mortality to over 90 percent of the overstory and 80 percent of the understory vegetation (Schmidt and others, 2002).

Ponderosa Pine forests in lower elevations of western Montana are considered Type I fire regimes. Grasslands and rangelands in central and eastern Montana are considered Type II fire regimes, because fire normally burns most of the vegetation. Forests in the upper elevations of western and central Montana that include Subalpine fir and Engleman spruce are considered Type V because fire is infrequent, but when it occurs it results in high mortality.

When land use and fire suppression interrupt historic fire regimes, vegetation densities increase and fire fuels can build-up. These changes can alter the size of fires, the intensity of the fires, and its potential severity. For example, if fire is suppressed in ponderosa pine forests, the understory may begin to support Douglas fir in dense patterns. When fire occurs, the increased fuels generate hotter fires that may result in mortality to ponderosa pines which are normally fire resistant. Changes in these fire patterns are identified as fire condition classes. The greater departure from normal historic fire regimes result in an increasing fire condition class as described below:

Condition Class 1 Fire regimes are within an historical range and the risk of losing key ecosystem components is low.

Condition Class 2 Fire regimes have been moderately altered from their historical range. The risk of losing key ecosystem components is moderate. This results in moderate changes to one or more of the following: fire size, intensity and severity, and landscape patterns. Vegetation attributes have been moderately altered from their historical range.

Condition Class 3 Fire regimes have been significantly altered from their historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals. This results in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range (from Schmidt and others, 2002).

Schmidt and others (2002) mapped the fire condition class across the country in 1 km grid cell size. **Figure 3.3.11-1** shows the Montana portion of the mapping. Please note that this methodology may not accurately represent the conditions in specific locations, but provides a broader picture of the entire state. Local hazard assessments provide greater detail on the specific wildfire hazards in each community.

3.3.11.4.2 Statewide Vulnerability to Wildland and Rangeland Fires

As identified above, all of Montana is vulnerable to fire. In any given year, wildfire can break out in any part of the state and impact rangelands, grasslands, and forests. They can endanger the communities that have developed in the wildland/urban interface and firefighters that must contain and prevent losses. Those areas where land use practices, fire suppression, and/or insect infestations have changed the fire condition class may be more vulnerable to the impacts from fire. Fires in these areas may burn hotter, may be more unpredictable, and have a greater potential for stand replacement severity. These types of fires may also reduce the abilities of firefighters to contain losses and may expose those fighting fires and living near fires to increased risks.

Counties with increased vulnerabilities may be those with high percentages of forest land under Fire Condition Class II and III or those counties with a high percentage of cropland in the federal CRP. **Table 3.3.11-4** identifies counties that have more than 40 percent of total land area mapped as Fire Condition Class II and III. **Table 3.3.11-5** identifies the counties with more than 20 percent of cropland in CRP. These counties are shown on **Figure 3.3.11-2.**

Figure 3.3.11-1 Fire Condition Class

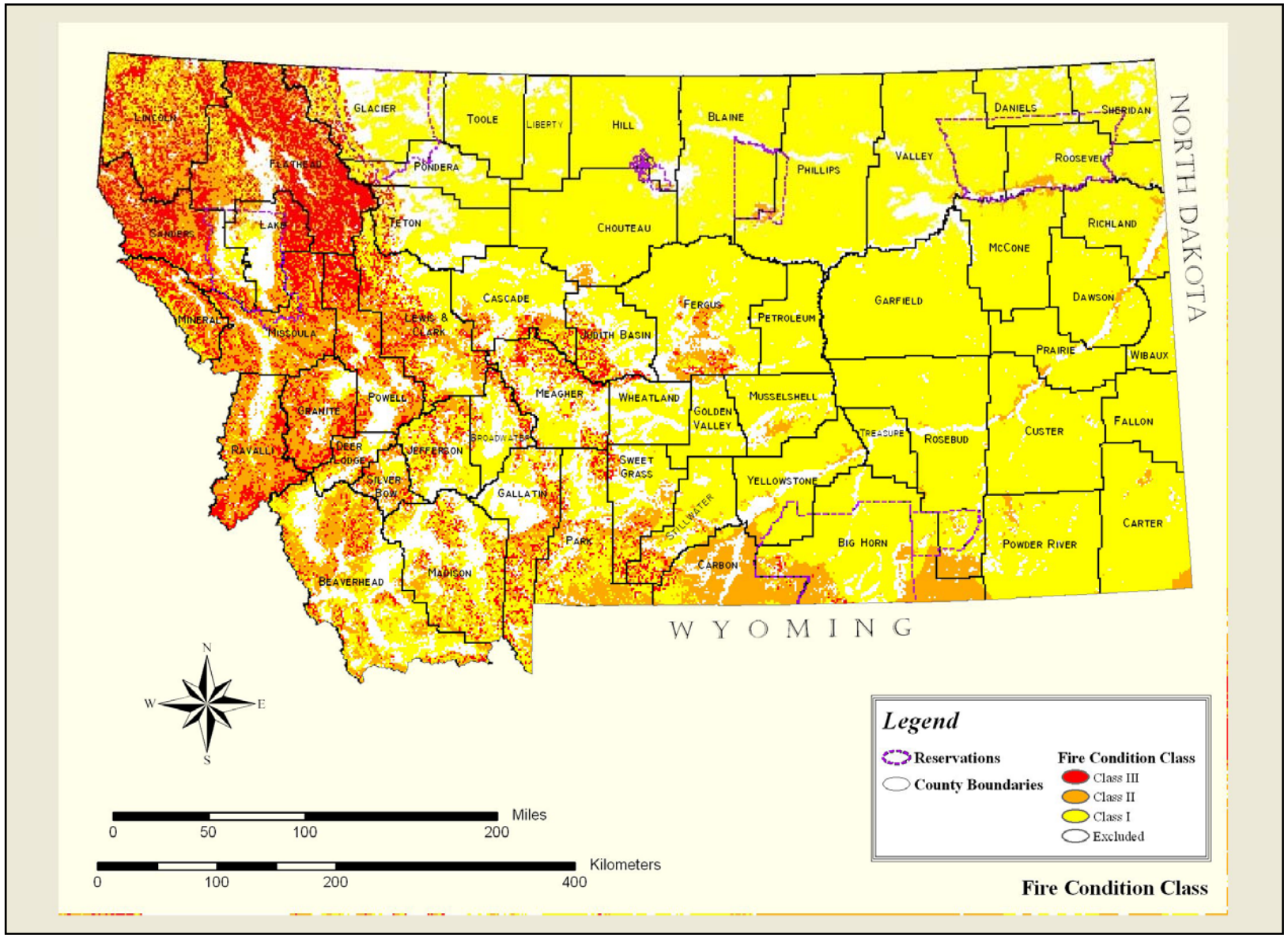


Figure 3.3.11-2 Wildfire Vulnerability

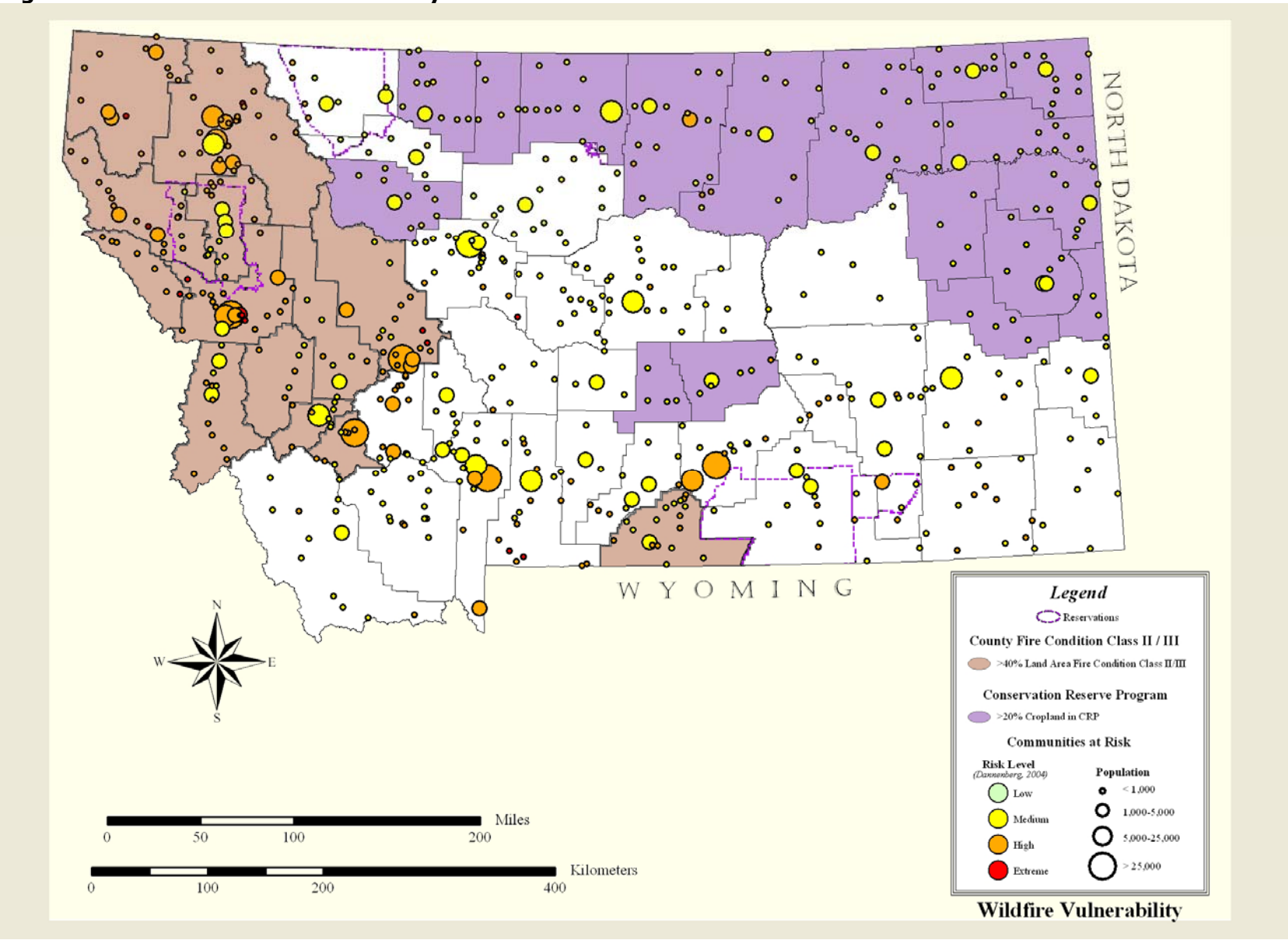


Table 3.3.11-4 Counties with Highest Acreage Class II/III Condition Class

County	County	Condition Class II		Condition Class III	
	Total Acres	Acres	% Area	Acres	% Area
Flathead	3,354,005	1,083,804	32.31%	1,660,054	49.49%
Lincoln	2,344,762	934,800	39.87%	704,745	30.06%
Missoula	1,671,175	892,792	53.42%	474,937	28.42%
Carbon	1,316,784	855,232	64.95%	25,946	1.97%
Ravalli	1,532,324	847,819	55.33%	392,156	25.59%
Sanders	1,780,466	739,339	41.53%	692,883	38.92%
Lewis & Clark	2,232,434	641,980	28.76%	356,573	15.97%
Powell	1,488,960	626,906	42.10%	384,743	25.84%
Granite	1,106,345	569,578	51.48%	258,472	23.36%
Mineral	780,785	353,361	45.26%	232,279	29.75%
Lake	1,055,355	243,399	23.06%	257,237	24.37%
Silver Bow	459,008	176,186	38.38%	55,599	12.11%
Deer Lodge	473,151	170,503	36.04%	45,467	9.61%

Source: Schmidt and others, 2002

Table 3.3.11-5 Counties with >20 Percent Cropland Under CRP

County	County	Cropland	Active CRP Contracts (1992-2008)		
	Total Acres	Total Acres	Acres	% Cropland	% County
Daniels	912,715	591,901	147,250	24.88%	16.13%
Liberty	925,755	627,078	148,880	23.74%	16.08%
Hill	1,865,477	1,218,379	294,671	24.19%	15.80%
Sheridan	1,091,671	703,452	159,696	22.70%	14.63%
Toole	1,244,848	708,175	177,378	25.05%	14.25%
Roosevelt	1,515,444	782,629	178,545	22.81%	11.78%
Teton	1,465,710	611,312	151,206	24.73%	10.32%
Richland	1,344,527	513,575	114,567	22.31%	8.52%
McCone	1,715,096	588,211	140,936	23.96%	8.22%
Wibaux	568,968	171,066	36,766	21.49%	6.46%
Valley	3,237,540	843,151	208,684	24.75%	6.45%
Golden Valley	752,063	190,373	47,303	24.85%	6.29%
Blaine	2,711,308	689,034	164,527	23.88%	6.07%
Dawson	1,523,385	465,004	92,307	19.85%	6.06%
Phillips	3,333,350	631,438	164,510	26.05%	4.94%
Prairie	1,113,873	165,190	40,580	24.57%	3.64%
Musselshell	1,196,012	163,586	39,971	24.43%	3.34%

Source: USDA, Farm Service Agency, 2007

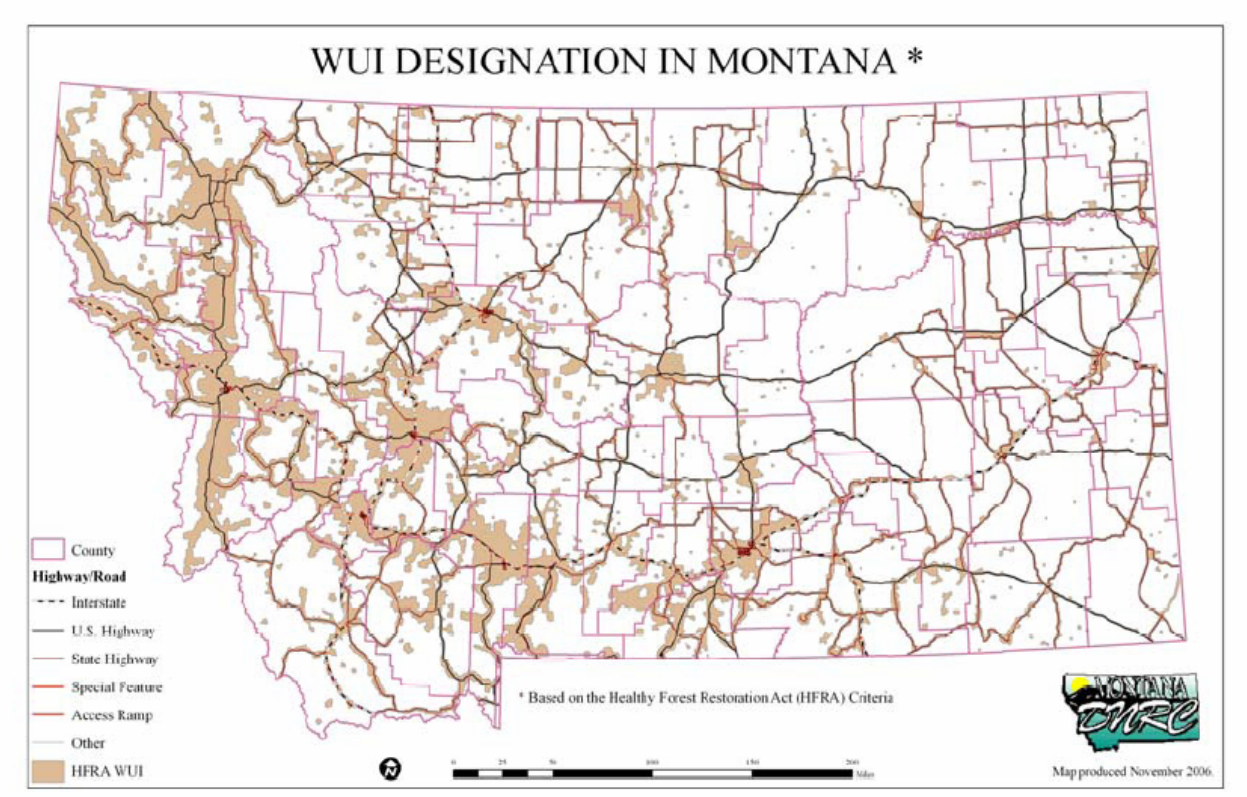
In addition to the above county analysis, the BLM completed a Communities At-Risk Analysis across the state, identifying fire risk factors immediately around Montana communities (Dannenberg, 2004). Data was collected on vegetation, slope, aspect, weather factors, development density, and building materials within a 5-mile radius of 622 towns and cities in Montana. The assessment method was adapted from the

"*Wildland/Urban Interface Fire Hazard Assessment Methodology*" as developed by the National Wildland/Urban Interface Fire Protection Program, 1998 (Firewise, 2004).

The results of the BLM communities risk assessment showed that 241 of the 622 communities in Montana (38.8 percent) were rated with an extreme or high fire danger rating. These communities and their relative risk to wildfire and rangeland fire are shown on **Figure 3.3.11-2.**

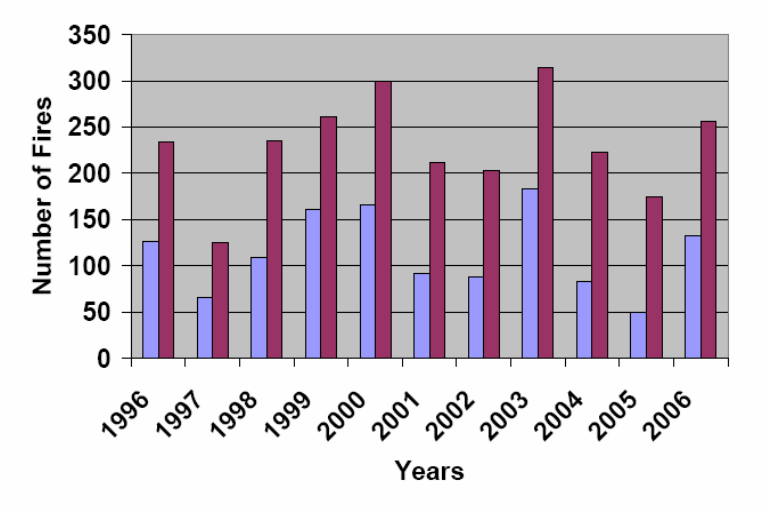
Increased population growth over the past two decades in Montana has resulted in an expanded WUI (**Figure 3.3.11-3**). Fires in these WUI areas have become much larger and burned with greater intensity (Arno, 1996 in Montana DNRC, 2006c). An accumulation of forest and grassland fuels, over-crowded stand conditions, and extended drought have increased the forest's vulnerability to fire from human activities and natural causes. Fires in WUI areas pose extreme risk to human life and property, increase the cost of fire suppression activities, and have significant social, economic, and natural resources impacts.

Figure 3.3.11-3 WUI Designation in Montana
Source: Montana DNRC, 2007c



More fires occur in the WUI than the non-WUI areas. Montana DNRC fire report data shows that through the direct protection program, 50 percent more fires occurred in WUI than non-WUI areas between 1996 and 2006 (**Figure 3.3.11-4**). Within the WUI areas, 64 percent of the fires were human-caused, with the majority of the causes being campfires, debris burning, and miscellaneous. Outside the WUI, only 27 percent of the fires were human-caused. Fires in the WUI cost an average 46 percent more to suppress than non-WUI fires. This increased cost of fire suppression is largely due to the higher costs in the WUI associated with structure protection (Montana DNRC, 2007c).

Figure 3.3.11-4 Number of Fires Occurring in the WUI (red) and Non-WUI (blue) on DNRC Direct Protection (1996-2006)
Source: Montana DNRC, 2007c



3.3.11.4.3 Review of Potential Losses in Local PDM Plans

Figure 3.3.11-5 presents the Wildfire Hazard Risk Map. The colors represent a high-medium-low risk rating based on information in the Local PDM Plans. The gray color indicates this hazard was not assessed in the Local Plan. The hatch pattern indicates the Local Plans were not available for review. For electronic users of the State Plan, clicking on a county or tribal reservation will take you to the Local Plan where further information is available.

Table 3.3.11-6 presents a summary of potential loss estimates due to wildfire as calculated in the Local PDM Plans. Wildfire loss is described in terms of its effect on buildings, society and the economy, where generally:

- Building loss is presented either as a dollar value or a high-moderate-low rating and typically refers to the potential loss to critical facilities in the jurisdiction.
- Societal loss is presented either as the number of lives at risk or as a high-moderate-low rating representing the potential for loss of human life.
- Economic risk is presented as a dollar value or high-moderate-low rating referring to the potential impact to the economy of the local jurisdiction.

References cited in **Table 3.3.11-6** correspond to a description of the method used to calculate potential loss that can be found in *Section 7.14.*

Figure 3.3.11-5 Hazard Risk Map: Wildfire

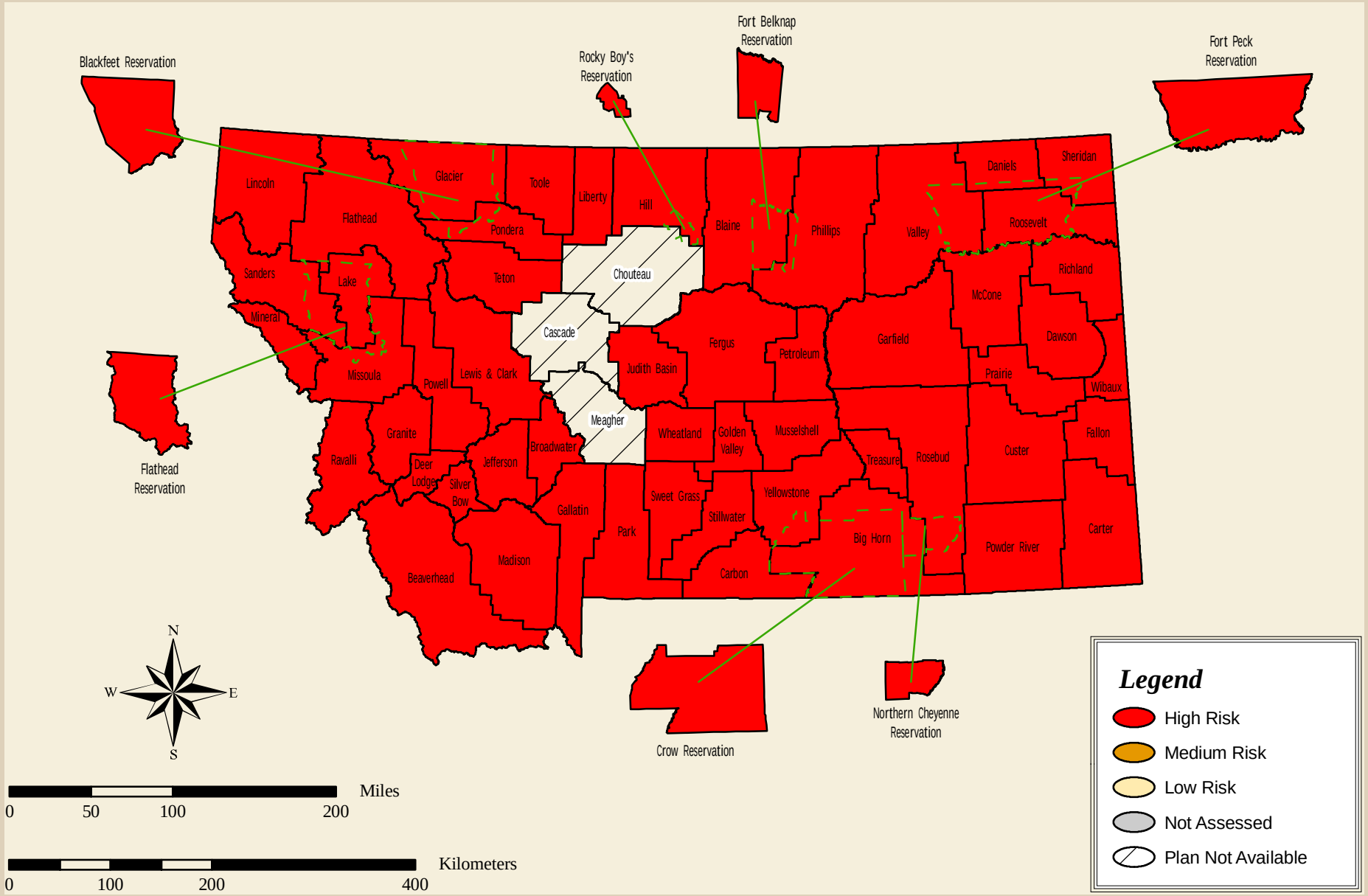


Table 3.3.4-10 Potential Losses from Local Plans: Wildfire

DES District	Jurisdiction	Building Loss	Societal Loss	Economic Loss	Reference
1	Deer Lodge County	$4,500,000	Moderate	Moderate	1
1	Flathead County	$150,000,000	High	High	8
1	Flathead Reservation	$103,979,000	3,592	NA	2
1	Granite County	$8,200,000	Moderate	$17,300,000	1
1	Lake County	$103,979,00	3,592	NA	2
1	Lincoln County	2	2	NA	9
1	Mineral County	$50-$100 million	High	NA	10
1	Missoula County	$50-$100 million	High	NA	10
1	Powell County	Medium	Medium	NA	10
1	Ravalli County	$100-$200 million	Very High	NA	10
1	Sanders County	$14,390,220	2,196	NA	2
1	Silver Bow County	$50 million	Moderate	High	1
2	Blackfeet Reservation	NA	NA	NA	
2	Blaine County	$239,891,597	NA	$29,151,879	2
2	Cascade County	U	U	U	
2	Chouteau County	U	U	U	
2	Fort Belknap Reservation	NA	NA	NA	
2	Glacier County	NA	NA	NA	
2	Hill County	$532,977,164	NA	$37,808,000	2
2	Liberty County	Low	Low	NA	11
2	Pondera County	NA	NA	NA	
2	Rocky Boy's Reservation	NA	NA	NA	
2	Teton County	NA	NA	NA	
2	Toole County	Low-Medium	Low	NA	11
3	Beaverhead County	$867,200,000	35,500	NA	5
3	Broadwater County	$3,500,000	Moderate	Moderate	1
3	Gallatin County	High	Moderate	Moderate	12
3	Jefferson County	NA	NA	NA	
3	Lewis & Clark County	$145,000,000	NA	NA	6
3	Madison County	NA	NA	NA	
3	Meagher County	U	U	U	
3	Park County	$9,400,000	Moderate	Moderate	1
3	Sweet Grass County	NA	NA	NA	
4	Carter County	High	Moderate	High	12
4	Custer County	Moderate	Moderate	NA	13
4	Dawson County	$453,610	NA	NA	8
4	Fallon County	$17,542	NA	$877	8
4	Garfield County	$4,154,00	228	Moderate-High	1
4	McCone County	$211,715	NA	High	3
4	Powder River County	$2,421,900	594	Millions	1
4	Prairie County	NA	NA	$300,000	3
4	Richland County	$352,610	Moderate	NA	3
4	Wibaux County	$200,045	NA	NA	3
5	Big Horn County	$30,000,000	NA	Severe	3
5	Carbon County	$44,290,000	High	High	8

Table 3.3.4-10 Potential Losses from Local Plans: Wildfire

DES District	Jurisdiction	Building Loss	Societal Loss	Economic Loss	Reference
5	Crow Reservation	Millions	High	Millions	3
5	Golden Valley County	NA	NA	NA	
5	Musselshell County	NA	NA	NA	
5	Northern Cheyenne Reservation	Millions	Moderate	Millions	3
5	Rosebud County	High	Moderate	High	1
5	Stillwater County	$14,553,950	NA	$56,073,541	8
5	Treasure County	High	High	High	1
5	Wheatland County	NA	NA	NA	
5	Yellowstone County	NA	NA	NA	
6	Daniels County	$9,030,162	121.5	NA	2
6	Fergus County	NA	3	5	4
6	Fort Peck Reservation	$28,060,758	619.5	NA	2
6	Judith Basin County	NA	NA	NA	
6	Petroleum County	NA	NA	NA	
6	Phillips County	$185,009,701	NA	$37,808,000	2
6	Roosevelt County	$22,415,785	555.2	NA	2
6	Sheridan County	$16,527,416	214.9	NA	2
6	Valley County	$32,380,759	416.1	NA	2

Notes: U = Local PDM Plan not available for review; NA = not assessed in Local PDM Plan
Potential loss was computed was not computed in a uniform manner in Local PDM Plans. See number references in *Section 7.14* for a description of the methods used to calculate potential building, society and economic loss.

3.3.11.4.4 Vulnerability to State Property

While structure loss can occur from wildland fire, most of the losses are related to timber and crop resources and the potential loss of life. State property that could be vulnerable to wildland fires include leased cropland and State forest property. Leased cropland and grazing leases return approximately $16.8 million annually to the state. Timber production from state-owned timber tracts returned $13 million in fiscal year 2006 (Montana DNRC, 2007b). The exposure of leased cropland and timber lands is low, as the return from these properties is relatively small.

State buildings located in counties with a high vulnerability to wildfire are considered to be indirectly exposed to wildfire. Those counties include two universities, the Capitol Complex, and state prison. **Table 3.3.11-7** identifies the structure and content value of state-owned facilities in those counties shown in **Figure 3.3.11-2**.

Table 3.3.11-7 State Building Values in Counties Highly Vulnerable to Wildland Fires

County	Building Value	Contents Value	Total Value	State Employee Count
Carbon	$1,149,030	$446,856	$1,595,886	56
Deer Lodge	$52,694,044	$10,429,310	$63,123,354	684
Flathead	$38,697,078	$10,881,240	$49,578,318	600
Granite	$404,516	$196,010	$600,526	34
Lake	$10,924,908	$3,994,159	$14,919,067	120
Lewis and Clark	$326,386,470	$185,642,670	$512,029,140	4,946

Table 3.3.11-7 State Building Values in Counties Highly Vulnerable to Wildland Fires

County	Building Value	Contents Value	Total Value	State Employee Count
Lincoln	$4,664,965	$2,370,170	$7,035,135	110
Mineral	$1,116,951	$531,895	$1,648,846	49
Missoula	$683,963,987	$193,808,935	$877,772,922	673
Powell	$103,862,149	$21,170,003	$125,032,152	385
Ravalli	$8,534,537	$1,931,144	$10,465,681	174
Sanders	$1,778,555	$771,777	$2,550,332	57
Silver Bow	$78,449,461	$23,186,164	$101,635,625	640
Totals	**$1,312,626,651**	**$455,360,333**	**$1,767,986,984**	**8,528**

Source: DOA, Risk Management and Tort Defense Division, 2007

3.3.11.5 Impact of Future Development

The wildland-urban interface is a very popular place to live in Montana. Development in the hazard areas has increased in recent years and has amplified the vulnerabilities in the unincorporated parts of the State. Regulating growth in these areas is a delicate balance between protecting private property rights and promoting public safety. Some counties have growth policies recognizing the wildfire threat and emphasizing defensible space, inspection of new development, water supplies, fuels mapping, and Firewise programs (Gallatin County Hazard Mitigation Plan, 2006).

The 2005 Montana legislature passed House Joint Resolution No. 10 which recognized what professionals working in the wildfire arena have been asserting for years: the laws have not kept up with changes in circumstances and technology, population growth, and changes in weather patterns (Kurtz, 2006). During the 2005-2006 interim, a work group endeavored to correct inconsistency, modernize policy, institute policy where none existed, and clarify authority where it had been murky. As a result, the 2007 Montana Legislative session passed a bill specific to wildfire and the wildland-urban interface that may reduce the impact of wildfire and rangeland fire on future development.

The new law (Senate Bill 51), set to take effect on October 1, 2009, is a revision to growth policy and subdivision law that require consideration of wildland fire. The law requires that growth policies include an evaluation of the potential for wildland fire, including whether or not there is need to delineate the WUI or adopt regulations that require defensible space around structures, adequate ingress and egress to and from structures to facilitate fire suppression activities, and/or adequate water supply for fire protection. Senate Bill 51 also amended subdivision regulations to require every county, city and town to reasonably avoid subdivisions where there is danger of injury to health, safety, or welfare by reason of natural hazard, including but not limited to fire and wildland fire. The regulations prohibit subdivisions in these areas unless the hazards can be eliminated or overcome by approved construction techniques or mitigation measures such as requiring sprinklers in certain circumstances or prohibiting cedar shake roofs.

The law engages the Department of Natural Resources and Conservation (DNRC) and the Department of Labor and Industry in developing rules and providing incentives to help cities and counties get ahead of growth in the WUI. This will include identifying best planning and land use practices for WUI development. The new law also requires promotion of forest management activities within and adjacent to the wildland-urban interface and directs the Montana DNRC, to develop by October 2009, rules addressing wildland-urban development

including potential means of enforcement. Senate Bill 51 became law with Governor Schweitzer's signature on May 8, 2007.

3.3.11.6 Wildland and Rangeland Fires Data Limitations

Assessing the wildland and rangeland fire hazard is greatly limited by the data currently available. Wildfires are dependent on so many factors that determining the vulnerability to a community is rather subjective and relies on a complex combination of variables. In addition, in a state such as Montana, with mountains in the west and grasslands to the east, a method to assess one area does not work on another. Therefore, the ability to conduct a comprehensive, statewide assessment is rather limited. In addition, to effectively determine vulnerability of State property, data identifying locations of State buildings is necessary. The current PCIIS building database is not geo-referenced and cannot be effectively related to spatial coordinates except in general locations (by city or zip code centroid).

3.3.11.7 Wildland and Rangeland Fires References

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